NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
CONTRACT NO. NAS 7-100

Invention Report No. 30-140

VALVE WITH BALL SEAT SPRING AND ANTIFLUTTER BAFFLE

Inventor: William F. MacGlashan, Jr.

Lloyd Spencer
Patent Counsel

Copy No. _____
pp. ii, 1-4

JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA, CALIFORNIA

July 27, 1962

Ref 36301

CASE NO. 431

INVENTION RECORD

To be submitted to Invention Reports Group

Jet Propulsion Laboratory
California Institute of Technology

1. Inventor name	position & title	P O address and legal residence
W. F. MacGlashan, Jr.	Senior Development Engineer	1141 So. Pasadena Drive Pasadena, California

2. Title of Invention VALVE WITH BALL SEAT SPRING AND ANTIFLUTTER BAFFLE

3. Brief Description and Novel Features

An unsupported ball when off its seat during flow, as in a ball check valve, tends to flutter. This flutter causes squeal and impact damage to the seat.

My invention prevents flutter by the use of a star spring to hold the ball on its seat. For severe high flow conditions, a baffle plate in conjunction with the star spring is necessary.

The star spring consists of a ball centered flange with integral radial fingers resting on the ball cavity innerface. Any tendency of the ball to flutter is damped by the friction of the fingers on the innerface. Three or more fingers may be used.

The baffle is used to direct the flow around the spring fingers in cases where the dynamic pressure would be great enough to damage the fingers. The pressure drop through the baffle exerts an additional force on the spring finger contacts. Thus, additional damping is automatically provided in proportion to the flow.

4. Historical Data	date	location
a. conception by inventor	Dec. 19, 61	JPL
b. disclosure to others	Dec. 19, 61	JPL
c. first sketch or drawing	Dec. 19, 61	JPL
d. first written description	This Disclosure	JPL
e. completion of model or full-sized device	Jan. 18, 62	JPL
f. first test or operation of invention	Feb. 12, 62	JPL

5. Names of Persons Acquainted With Items 4 thru 7

Louis R. Toth
Orville F. Keller
Richard S. Weiner

6. Results of Test
Operation has been satisfactory

7. Applications and State of Development This is suitable for any ball seat a application. It is in use in the mariner "B" regulator and check valve.

8. Reference Reports, Publications and Drawings Sketch NO. 62x01100
Mariner "B" Regulator #J4700402
Mariner "B" Check valve #J8700037

9. Patents

10. Licenses

11. Contract No.
7-100

12. Signatures -- give signature and date, first names in full

a. witnesses Subscribed and sworn to before me this 27th day of July 1962

Notary Public
In and for the County of Los Angeles, State of California

LEONARD S. SAUER, Notary Public
In and for the County of Los Angeles, State of California
My Commission Expires May 17, 1963
4537 Hill St., La Canada, Calif.

b. inventors W. F. MacGlashan, Jr. July 27, 1962
W. F. MacGlashan, Jr. Date

JPL 60-096

based on OD form 325 1 apr 53

VALVE WITH BALL SEAT SPRING AND ANTIFLUTTER BAFFLE

My invention relates to a means for preventing flutter in a ball check valve in a manner so as to prevent squeal and impact damage to the valve seat. This valve is specifically intended for use in applications for severe high-flow conditions.

Therefore:

It is an object of my invention to provide a ball check valve for use in severe high-flow conditions.

It is a second object of my invention to provide a ball check valve whereby the ball is held under tension by a star spring to eliminate squeal and damage to the valve seat.

A third object of my invention is to provide a ball check valve having a baffle plate and a star spring combination which further provides for a flow path around the star spring thus avoiding the effects of high-flow upon the star spring causing flutter and squeal in the valve.

These and other objects of my invention will become more apparent when referring to the following detailed description in the light of the drawings where:

Figure 1 is a cross sectional view of the valve in a closed position.

Figure 2 is a section 2-2 of Figure 1.

Figure 3 is a view showing the means by which the star spring is retained.

Figure 4 is a sectional view of the valve in an open position.

Reference is now directed to Figure 1. A cylindrical valve body 1 is comprised of an upper portion 2 and a lower portion 3. The lower portion 3 is provided with a centrally located annular recess 4 in its upper face. An axially disposed centrally located bore 5 opens into the recess at its upper end and terminates in a fitting 6 at its lower end providing a through passage in this portion of the valve. The upper end of the bore 5 serves as the seat for the ball.

An annularly formed baffle member 7 adapted to fit snugly into the annular recess 4 is provided with a central bore 8 which is adapted to receive the ball 9. The lower portion of the baffle member 7 is provided with an axially disposed annular flange 10 about the perimeter of its lower face while the upper face 11 is concave in contour to provide space for the action of the star spring 12. A plurality of axially disposed through bores 13 uniformly spaced around the central bore 8 provides means for gas passage around the ball member 9.

A plurality of axially disposed through bores 14 spaced about the periphery of the valve body are adapted to receive the assembly studs 15.

The upper portion 2 is provided with an annular protrusion 16 centrally disposed on its lower surface and adapted to close off the upper portion of the annular recess 4. A radially disposed annular groove 17 disposed radially outwardly on the outer surface of the protrusion 16 provides means for an O ring seal between the two portions of the valve body. An axially disposed annular bore 18 axially aligned with the bore 5 in the lower portion of the valve body terminates in a plurality of diagonally disposed bores 19 at its lower end and into a normal AN fitting 20 at its upper end, thus, providing a through passage through the valve body.

A plurality of actually disposed screw threaded bores 21 are provided in the lower surface of the portion 2 and are adapted to match the bores 14 of the lower portion of the valve body in a manner so as to receive the assembly studs 15.

Reference is now made to Figure 2.

The spring member 12 is provided with a substantially circular central portion 22 having a central bore 23 which is substantially smaller in its internal diameter than the diameter of the ball 9. Radially disposed from the central portion of these springs are a plurality of fingers 24 uniformly disposed around the central portion 22 in a manner so as to provide a free passage of fluid through the annular bores 13 in the baffle 7 below. The spring 12 is held in position so it will not rotate by a pair of retaining pegs 25. One

pair of retaining pegs are spaced in a manner so as to receive the outer end of one of the fingers 24 to restrain the spring from lateral movement as is indicated in Figure 3.

Reference is now directed to Figure 4.

The valve is shown in an open or flow position whereby the ball 9 has been unseated by flow conditions forcing the spring 12 upwardly against the lower surface of the annular portion 16 of the valve body.

LSS:ni

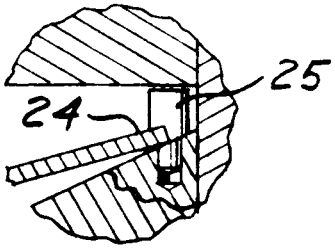

FIG. 3

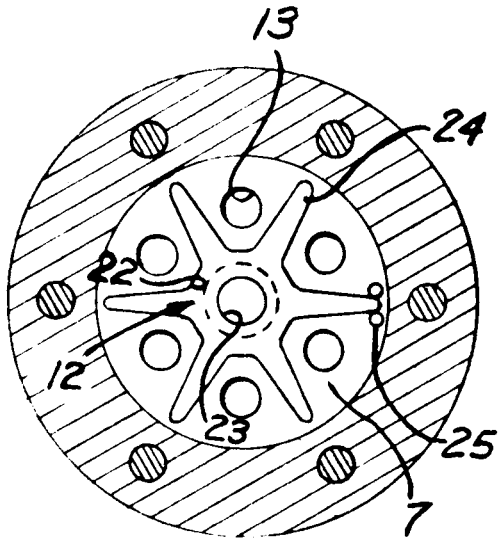

FIG. 2

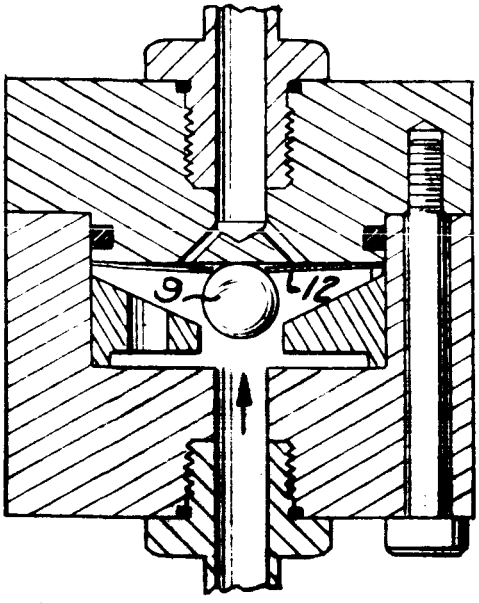

FIG. 4

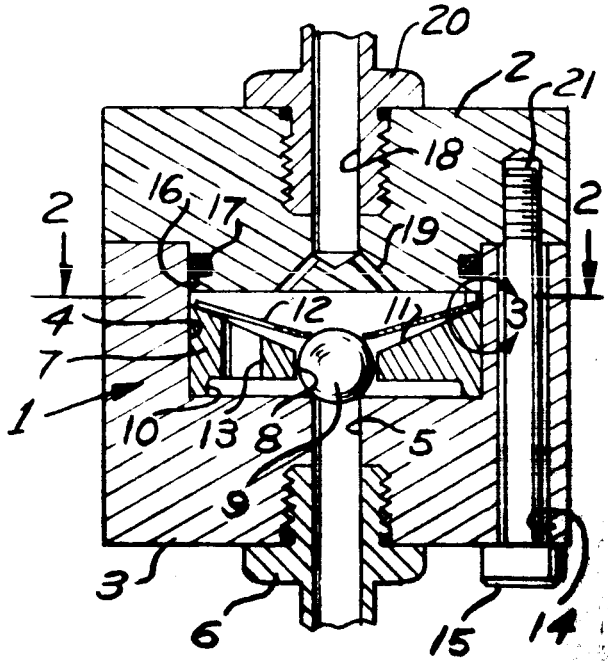

FIG. 1